YUKON GOLD COMPANY

JUNE · 1911

An Abridged History

WITH ILLUSTRATIONS

OF THE OPERATIONS OF THE

Yukon Gold Company

JUNE · 1911

Hydraulicking on American Hill.

To the Stockholders of the Yukon Gold Company.

Gentlemen:

The nature of the work undertaken by the company in which you are interested is so little understood, and the conditions governing mining in the far north are so unusual that the Directors have decided to place before you an illustrated and descriptive story of the progress of the operations in addition to the annual report which has recently been mailed you.

We trust this effort to inform you fully as to the objects and accomplishments of the company will meet with your approval.

Very truly yours,

S. R. GUGGENHEIM,
President.

New York, June 1st, 1911.

YUKON GOLD COMPANY

IN order to understand the nature of the undertaking of the Yukon Gold Company it is necessary to gather some idea of the history of the Klondike Gold Fields, the nature of the deposits and the conditions surrounding mining as carried on in this district. The Department of the Interior of Canada has recently published a work entitled "The Yukon Territory—Its History and Resources," which gives a very comprehensive review of the discovery of gold in the Yukon and the world famous rush of adventurers from every class of society to the Klondike Fields in 1898 and 1899. This work, however, is not known to the general public, so that something of the character of the country, as well as the deposits which are now being mined, is shown in the accompanying photographs.

The Klondike District, so-called, lies in the Canadian portion of the Alaska Peninsula, known as the Yukon Territory. It is reached by steamer to Skagway, in southeastern Alaska, thence by railway over the White Pass on the famous White Pass & Yukon Route, and thence by steamers owned by the same company down the upper waters of the Yukon through Lake Lebarge to the City of Dawson, which is the business center of the Yukon. The distance by water from Seattle or Vancouver to Skagway is 900 miles; the distance by rail 110 miles to Whitehorse, which is the starting point of navigation, and from Whitehorse to Dawson 435 miles by river steamers, similar in size and design to the steamers operated on the Ohio or on the more western rivers of the United States.

Dawson is also reached by water during the summer season by larger river steamers, of which the packets "Sarah" and "Susie" are fair examples, which run from St. Michaels, a seaport opposite from Nome on Behring Sea, up the Yukon, supplying, as well, the other prominent mining localities of Alaska situated on or near the Yukon River.

The mention of Alaska or the Yukon usually conveys the impression of extreme cold and hardships, such as have been pictured in story and photograph ever since the days of the rush to the Klondike and to Nome. As a matter of fact, the Klondike District, as well as the other mining camps in the interior of Alaska, enjoys a summer season that is unsurpassed. The days are comfortably warm and pleasant,—bright and sunshiny, for the most part, with intermittent showers and occasional thunder storms. During all of June and the greater part of July there is no darkness, as the City of Dawson lies so near the Arctic Circle that daylight lasts practically twenty-four hours during the latter part of May, June, July and into early August. The conditions for out-of-door work are excellent. The cool, bracing air, bright nights, a plentitude of

fresh vegetables and all the necessaries of life, as well as most of the luxuries, make for health and energy in all classes of the inhabitants. The working men are, as a rule, strong, healthy and energetic. They represent, for the most part, men who have worked their own claims and who have survived the struggle and hardships of the early days. It is often remarked by the tourist that Dawson has the best of everything in the way of food supplies, and this is indeed the case, as the cost of transportation represents such a large proportion of the cost of supplies that only the best of everything is ordered and shipped into this country.

Now, as to the gravel deposits from which came the wealth of gold which has made the Klondike famous. The first discoveries were made in the creek bottoms where the seasoned prospector always conducts his first explorations. It was not until the work in the creek bottoms was well under way, and the creek claims were producing their millions, that the discovery was made that high upon the hills a deposit of gravel existed which, in a great many places, was as rich in gold as the creek beds themselves. The discovery of these higher level deposits, now known as the "White Channel," is generally attributed to a novice, who knew no better than to climb a hill to locate a placer claim. As the discoveries followed one after another on the various hills, it was soon proven that a large channel of gravel existed following the general course of the present streams, but high above them at elevations ranging from 150 feet at the upper end of the hill deposit to 300 feet and over at the lower end. Thousands of miners were soon swarming on the hills, sinking shafts, driving tunnels and taking out the gold-bearing material as rapidly as their co-laborers were in the creek bottoms.

The early seekers of wealth in the Klondike who were fortunate enough to stake or acquire a claim, found, on sinking their prospect shafts, a condition which was strange to them, particularly if they came from the more temperate zones. The gravel in its undisturbed condition was found to be frozen solid and covered by a bed of "Muck," so-called, which is decomposed organic matter in a frozen state. On top of the muck was a layer of heavy Arctic moss, which served as a perfect insulator and preserver of the frozen condition existing underneath. It was commonly supposed that this condition was due to the extreme cold of the winter when the thermometer registers 25° to 60° below zero for weeks at a time. That this is not the case has been proven by changes which have taken place since the gold-bearing gravels were first discovered. The frozen condition in reality dates back to the ice age, and when once the gravels are exposed to the action of the sun or the flow of streams, the frozen condition disappears and does not return with the cold of the succeeding winter season. In the gradual recession of the line of frost which once reached to the center of our middle western states, the northern countries have been the last to yield and with the

slow yielding a heavy covering of moss spring up which has preserved the condition which existed centuries ago. The fact of the gravel being frozen so that it would stand without timbering was a god-send to the early miners who were without knowledge of timbering methods. It has been, however, one of the most serious obstacles which the more recent large scale operators have had to overcome.

In the few years following the discovery of the Klondike and the rush of gold seekers, the district produced an amount of gold which made its name a synonym for wealth. The great extent of the gold-bearing creeks and the number of claims wherein local concentration had taken place gave a large range to the operations and brought great wealth to the individuals who were fortunate enough to have staked or purchased a well-located claim. The production bounded up to over $39,000,000.00 in 1901, and reached a total estimated at about $80,000,000.00 by the year 1905. At this time, and previous to 1905, the camp began to decline. The extremely rich and highly profitable claims had been, for the most part, worked out and the ground remaining, in many cases, was not sufficiently rich to pay to work by the expensive methods in use. The experiences of several years had cheapened the cost of working the creek claims by the introduction of steam scrapers, self-dumping buckets and other appliances to minimize the amount of pick and shovel work, but the cost still remained high. The hill deposits had been tunnelled and gophered until the majority of their wealth lying near the bedrock had been extracted. The early miners, and particularly those familiar with hydraulicking, had been struck with the favorable conditions for working the hill deposits by this method. By the seasons of 1902 and 1903 several plants had been installed, and some of them were in successful operation. It was found that the gravels being frozen did not interfere when once a face of sufficient length was opened to the sun and the warm summer air. The principal detriment to successful hydraulic mining was the scanty and erratic nature of the water supply. After the thaw in the spring the normal summer condition is one of dryness relieved by occasional heavy showers. These showers occasionally permit of some hydraulicking to be done in midsummer, but for the most part the work was confined to the early spring and the fall after the rains began. The result was, that while the hydraulic method, as a method, was proven to be a success for handling the ground, it was expensive, and in some cases unsuccessful, due to the intermittent character of the water supply.

Along the creeks the old methods, with the improvements suggested by experience, still prevailed. Dredging had been tried in a small way, but was not looked upon with great favor, although the first large dredge installed on the Klondike Valley was successful from the beginning. The principal factors making for high cost were the small size of the claims, individual ownership, intermittent and scanty water supply, high cost of fuel, labor and supplies.

Many schemes had been promulgated to overcome the water difficulties and to cheapen the cost of power, but up to the time the Yukon Gold Company entered the field the efforts to secure Government assistance or financial aid for such enterprises had come to naught.

After a study of the conditions existing in the district in 1905 a new scheme was evolved, which contemplated the purchase and ownership of a large number of claims so situated as to make continuous groups on all the principal productive creeks, to introduce a permanent water supply, electric power system, mechanical excavators, and machinery for working the gravels on a large scale which was to be followed later by hydraulicking the hill gravels or "White Channel" deposits as rapidly as tailing ground was provided. The carrying out of this scheme resulted in the formation of the Yukon Gold Company.

A water system for the Klondike had been talked of for years. Preliminary surveys had been made for diverting water from the Klondike river, but the expense of the undertaking made it practically prohibitive The most feasible water supply was from the main right fork of the Twelve-mile River, known as the "Tombstone," and this meant the construction of a water conduit, consisting of flume, ditch, and pipe line, of over 64 miles in length before the gravel deposits were reached. The photographs give a fair idea of the magnitude of this undertaking. When it is realized that this work was carried on thousands of miles from the source of supply of the raw materials and through a country which was an absolute wilderness, some idea may be had of the many difficulties which had to be met and overcome.

After the purchase of the properties now owned by the Yukon Gold Company had been completed and the equipment plans had been made, something over three years were required to complete the project. Practically the entire construction work was finished in three seasons of four months each, or a little over one year of actual construction work. In this period of time the entire equipment was completed and put in operation, consisting of:

1. Main ditch system 64.2 miles of main line, composed of 15 miles of flume, 37 miles of ditch, and 12 miles of pipe line, crossing five depressions and delivering water to the Lower Bonanza hills under a head of 500 feet. The capacity of the main ditch is 5,000 miners inches, and some idea of its size may be had from the photographs. The Bonanza Extension, completed in 1909, is approximately 6 miles in length, has a 3,000 miners inch capacity and crosses three depressions. The total length of the ditch system and extensions is 72.2 miles.

2. Hydro-electric plant operated by water from the Little Twelve-mile river carried through five miles of flume and delivered to the plant under 650 feet net

effective head. The installation consists of three 650 K.W. generators, direct connected to three water wheels of the impulse type. The main transmission line is 36 miles in length, operating at 35,000 volts, with 18.2 miles of extensions and secondaries.

3. Installation of seven dredges with their thawing plants and auxiliaries, three of which are of the five-foot close connected type, and four of the seven-foot close connected. The seven dredges have an actual capacity of over 3,500,000 cubic yards in a season.

4. Three mechanical elevators with a capacity of 2,000 cubic yards per day each, complete with pipe lines, transformers, motors, and pumping equipment.

5. Storage dam on Upper Bonanza 68 feet high at the crest, 205 feet wide at the base, and 465 feet long at the top, with impounding capacity of 54,000,000 gallons.

6. Equipment for the hydraulic mines, including auxiliary pipe lines from the main water system, gates, giants, tunnels, cuts and sluice ways. The hydraulic plants when in full operation will have a capacity of over 1,500,000 cubic yards per annum.

In addition to the items enumerated above there are shops, warehouses, warm and cold storage, bunk houses for the men, stables, camps, telephone system, and all of the equipment necessary for a mining operation of this size.

All of the construction work outlined above was carried on in the face of most unusual difficulties. Roads had to be built to handle the heavy pipe lines and all the supplies necessary for the small army of men engaged on the construction work. The major portion of the freighting was done in the winter, using heavy sleds of the Michigan logging type over roads kept smooth and glassy by snow plow and water sled. Over 30,000 tons of freight were hauled over the winter roads alone. Many novel engineering problems were met with, due to the frozen condition of a large portion of the country through which the water system was constructed. In some cases it was necessary to go through over 60 feet of frozen muck before solid foundation could be found to support the pipe lines. The "Klondike Syphon"—the huge pipe line which carries the water across the valley of the Klondike—was in itself alone an undertaking of the first magnitude. On account of the length and size of this line and the high pressure involved, as well as the nature of the country to be crossed, the successful completion of this portion of the system in the time allowed may justly be called an engineering triumph.

Mr. T. A. Rickard thus describes his impression of the construction of the water system in his interesting book, "Through the Yukon and Alaska":—

> "The country traversed by this ditch is a rolling woodland indented by the alluvial flats of the Klondike, the Twelve-mile, and other streams flowing into the Yukon River. As seen from a height, the wilderness stretches unbroken from the meandering shimmer of the Klondike, enclosed within high banks on which white scars mark bench-diggings, to the Ogilvie range, where, far to the north, the snow still lingers in token of the gift of water that shall enable men to win the gold from the deposits of gravel strewing the tortuous valleys. The engineer who first planned the line of flume, ditch and pipe had that kind of constructive imagination which is the creative force behind all engineering work. He imagined the deed done, and then he calmly began to calculate how to accomplish it. . . . .
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> "In preparing to build the ditch, the first step was to place a sawmill on the Twelve-mile River, and thus to obtain the lumber for construction. Then an electric generating plant was erected, and the wires were strung on poles for 36 miles, transmitting power from the Little Twelve-mile River to Bonanza Creek. While this was being done, surveys for the ditch were hastened. As soon as the surveys were completed, the right-of-way was cleared. The small growth of forest was removed, and the moss stripped from the frozen ground for a width of one chain (22 yards). Then steam-shovels were put to work, and while they were digging the ditch, the sawmill on the Twelve-mile yielded the lumber needed for the construction of the flume and for other purposes. Seven million feet (board measure) of lumber was cut; this depleted the small forest in the vicinity, but it proved sufficient.
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> "Without the steam-shovel it would have been hardly possible to dig the ditch in an economical manner, for manual labor at $4.00 per day, plus board at $2.00, or a total of $6.00 per day, is a costly instrument of engineering. Six shovels were employed. These made the cut, which was then beveled by hand, to be followed by the laying of moss on the sloping sides, with a little fine dirt as a finishing touch.
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> "Roads of the corduroy type have been constructed, moss being laid on the poles and dirt on the moss. The trails traverse the brush in straight lines. Horses and men, steam and muscle, have fought against the wilderness and subdued it. The big ditch looks like a Panama canal, and the steam-shovels groaning and digging in the deep cuts recall pictures of Culebra. Many of the laborers had worked on the Isthmian canal, and assuredly the young engineers were as proud of the work they were accomplishing as if it were a national or even an international enterprise."

The operations of the Yukon Gold Company in the Klondike Fields cover such a wide range that a detailed description would require too much space to be attempted here. The photographs will serve to illustrate individual operations, but no view or panorama can indicate the extent of the mining operation or illustrate its numerous phases. Perhaps the most interesting feature of the entire operation is the development of dredging in the creek bottoms in its application to the frozen gravels of the North. Dredging for gold as it is carried on in California and other temperate climates has been pictured and described until it is fairly well understood by those conversant with modern mining methods. In adapting this method to the creek gravels in the Yukon many changes had to be made in the methods and machinery to make the operation successful. First of all the dredges had to be strongly built in order to withstand the severe service of digging the broken schist which composes the bedrock, and coming into contact with frozen gravel which is almost as impenetrable as granite. The most serious problem was to overcome the frozen condition so that the

material could be handled as readily as similar ground in California or elsewhere. The first efforts to accomplish this were in the line of removing the top covering of moss and muck by ground sluicing. This was found adequate in some cases, but was proven to be too slow and expensive, as well as of doubtful result where the gravels were deep or the top covering unusually thick. Due to the drifting and open cut operations which had been carried on for years before the dredge was introduced a large portion of the ground was thrown open so that it thawed naturally and presents no obstacle to dredging. The thawing of the frozen portions was accomplished by successive modifications of the method of thawing by steam which had been in use in the country for some years. A detailed description of the thawing plants will not be attempted here. It is sufficient to say that by increasing the size of the boiler plants and their thawing equipment and by continual experiments with the spacing and material of which the points were composed, it has been found possible to thaw the gravels at a reasonable cost and make the whole of the creek beds workable as one deposit.

With the first view of the dredge at work one is immediately impressed with the size and power of the machines and with the apparent simplicity of the operation. While the operation appears simple, the modern gold dredge combines a number of elements which make it an efficient machine, and the accomplishment of its various functions involves a most careful adjustment of a number of independent machines, all more or less complicated. The dredge has not only to excavate the material, to wash it, and extract the gold, but finally to dispose of the tailings. The dredges take everything in their path, tailings from former operations, as well as virgin ground, and leave behind them regular and orderly rows of tailings piled high above the level of the surrounding ground.

The hydraulic work is equally interesting and impressive. The streams of water driven from the nozzles with a pressure of upward of 100 pounds to the inch strike the banks with a roar that can be heard for miles. Here again skilled engineering has to be brought into play to determine the depth and location of cuts and tunnels, and the carrying power and cutting action of the water, with a view to obtaining the highest possible duty. The same methods that were used to develop the California hydraulic mines were put into use in the Yukon. The gravel, with its high percentage of quartz sand, washes easily, and the frozen ground offers no hindrance to the operation. It is difficult to appreciate when watching the hydraulic giants at work, that the water which is tearing down the hill banks has traveled over hills and valleys a distance of nearly 70 miles.

The operation should be seen in order to appreciate its scope and magnitude, but it is hoped that the photographs will give some idea of this enterprise during its construction period and in its present state of steady operation.

View on the White Pass & Yukon Route near Summit of White Pass.

City of Dawson, Y. T., showing Mouth of Klondike River.

Klondike Dog Team. Winter View on Yukon River.

One of the White Pass & Yukon Route Steamers passing through Five Finger Rapids on the Yukon River.

White Pass & Yukon Route Steamer on the Yukon River, near Selwyn.

Open cut on Bonanza, showing early method of tramming and washing. Note the higher level or "White Channel" deposit in the background.

Underground work on Eldorado. Drifting out the pay streak.

Thawing with wood fires for drifting operations.

Early work on hills. Rocking out the dumps.

Winter dumps on Bonanza.

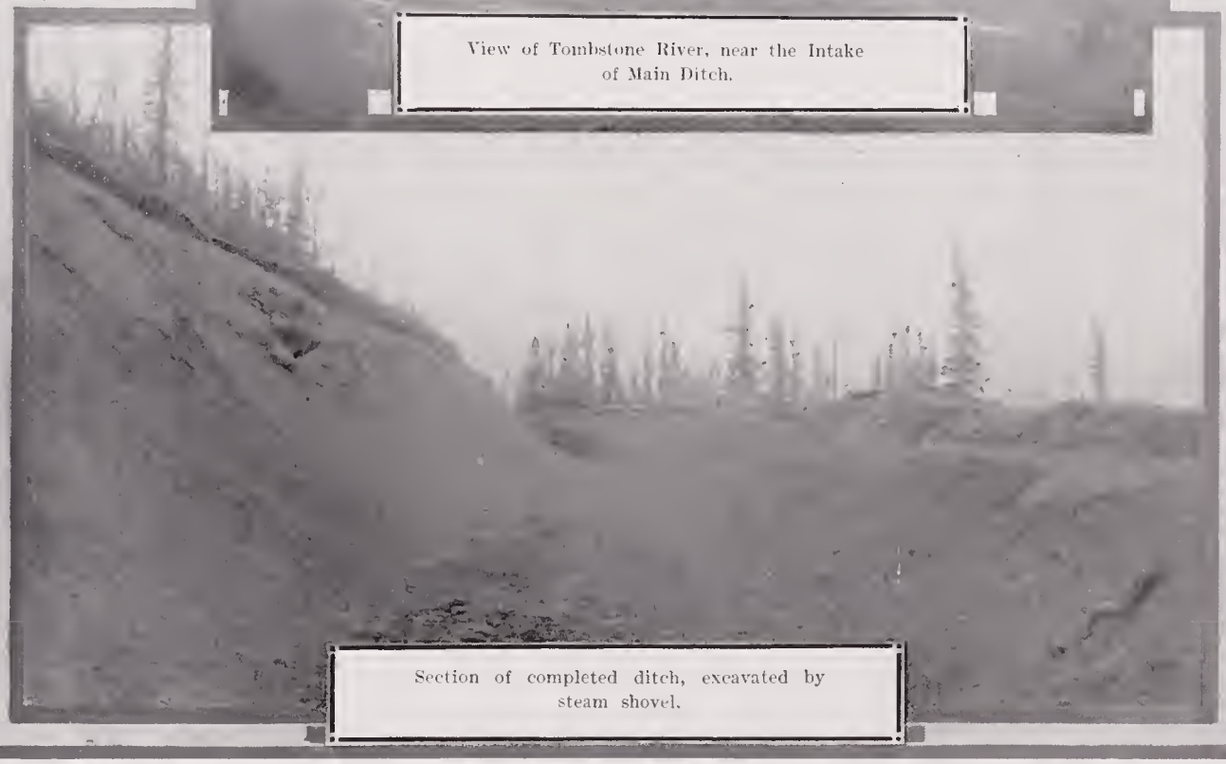
Ogilvie Range, near the intake, showing source of water supply and contour of country traversed by ditch system.

Section of completed flume.

Lumber distributed along right-of-way, ready for flume construction.
Note Tombstone Mountain in background.

Putting in underpinning in early spring.

View of Tombstone River, near the Intake of Main Ditch.



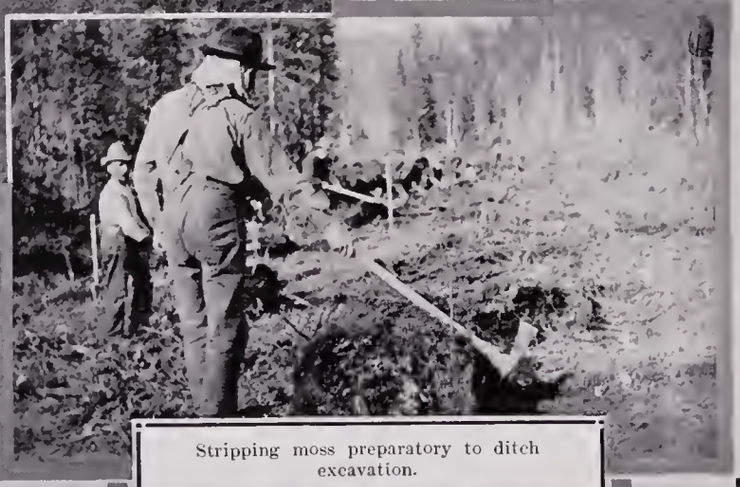
Section of completed ditch, excavated by steam shovel.

Main ditch in operation.

Road construction. Clearing right-of-way.

Tour of inspection.—Construction engineers in steam shovel cut.

View of completed ditch, puddled and ready for water



Stripping moss preparatory to ditch excavation.

Pipe line construction, Klondike syphon, showing bridge carrying pipe across Klondike River.

Winter freighting—hauling power plant machinery from Yukon River to Power House.

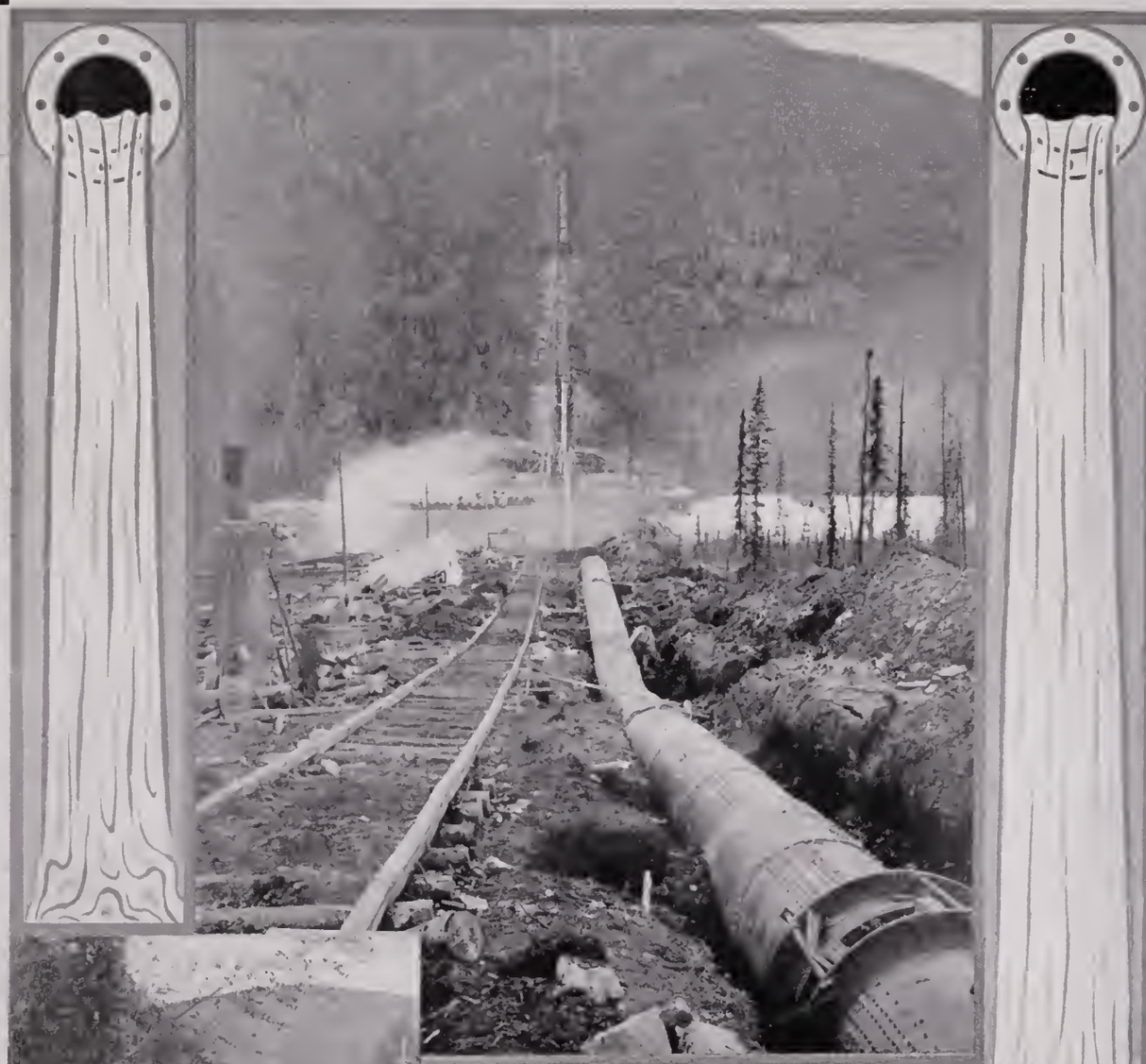
Winter freighting—hauling pipe line from Yukon River to Power House.

Wood stave pipe crossing on Bonanza Division.

Riveting expansion joint, Klondike syphon.

Constructing Klondike syphon. Section of pipe line shown here is under a pressure of approximately 500 pounds to the square inch.

Assembling stave pipe on Lepine Ridge. The depression at this point is crossed by a pipe line of approximately three miles in length.



Pipe line under construction crossing Little Twelve-Mile River, taken from above the Power Plant.

Portion of high pressure pipe line crossing Klondike Valley, showing man-hole and expansion joint.

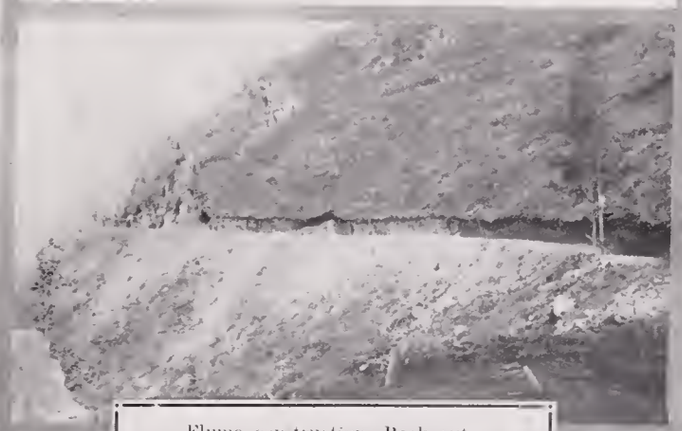
Portion of the Bonanza Division, showing pipe line crossing Adams Creek.

Ditch excavation. Steam shovel in operation.

Flume construction. Benching for the sills.

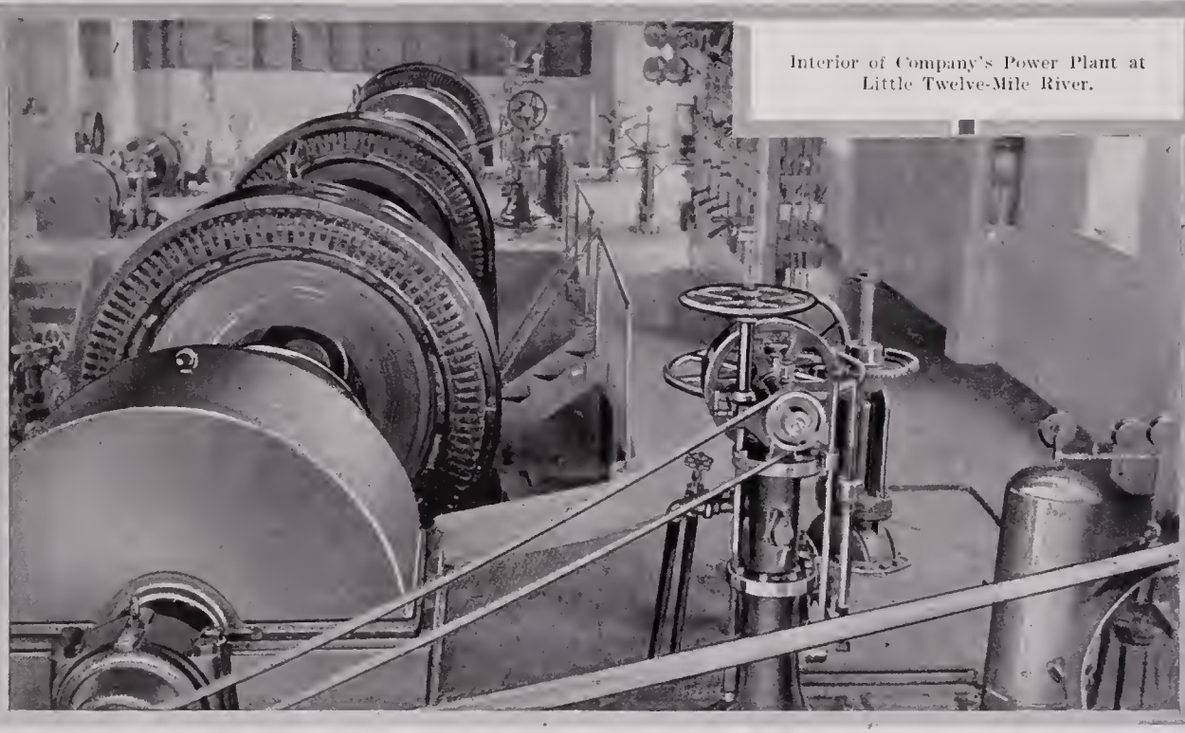
Flume construction around "Rocky Point" in the Twelve-Mile Valley.

Underpinning on Klondike face for flume.

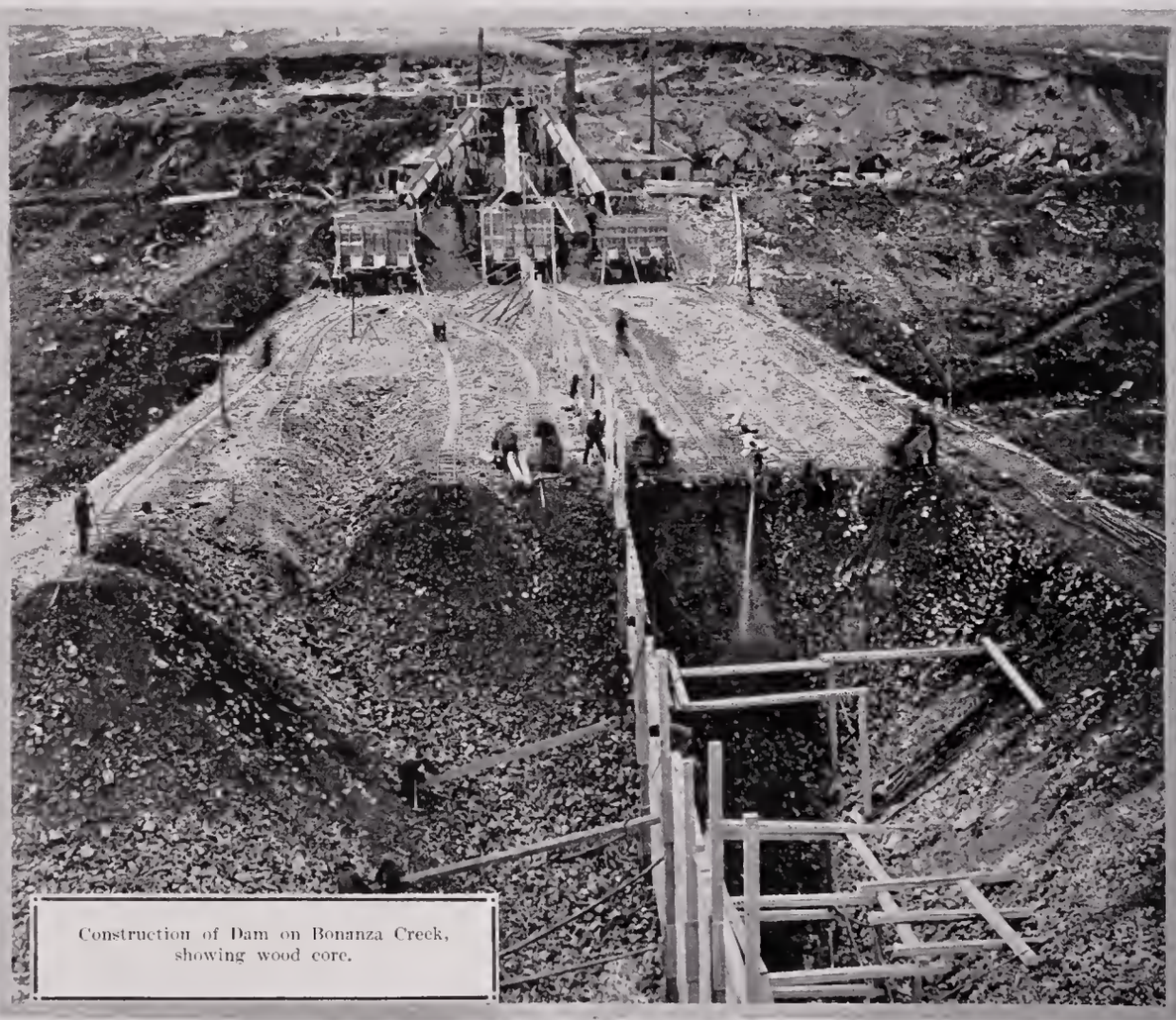


Flume construction Rock cut.

Finished ditch in operation.



Interior of Company's Power Plant at Little Twelve-Mile River.



Construction of Dam on Bonanza Creek, showing wood core.

Dredge construction at mouth of Bonanza Creek,—two dredges building in the same pit. Shows one dredge complete to the superstructure and the hull of the other under way. Note hill deposits and hydraulic tailings in the background.

Mechanical elevator ready for operation. Machines electrically operated. Gold-bearing gravel driven to a sump by water under pressure; elevated by buckets to flume in background.

Dredges Nos. 1 and 2 under construction.

Dredge No. 3, operating on Bonanza Creek.

Front view Dredge No. 6, operating on Bonanza Creek.

Dredge No. 4, operating on Hunker Creek.

Rear view Dredge No. 6, operating on Bonanza Creek.

Hydraulic operations on American Gulch and American Hill.

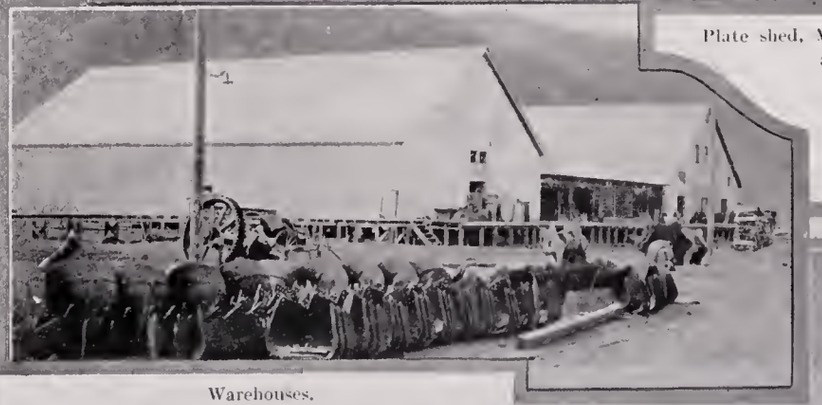
Hydraulic operations on American Hill.

Another view of hydraulicking on American Hill.

Looking up Klondike Valley—shops and warehouses in distance.

Plate shed and Machine Shop.

Plate shed, Machine Shop, warehouses and stables.



Warehouses.

Front view machine shop and pumping plant.

Machine shops and warehouses. This view is taken looking up Bonanza from the mouth, and shows the dredge tailings, with two dredges in the distance.

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